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Finesse® 325

Operator Guide

A78110100 Issue 7 - English

Thermo SCIENTIFIC

A78110100 Issue 7

SYMBOLS

The following symbols and conventions are used throughout this manual and on the instrument.

THIS SYMBOL IS USED ON THE EQUIPMENT, OR IN A DOCUMENT, TO WARN THAT INSTRUCTIONS MUST BE FOLLOWED FOR SAFE AND CORRECT OPERATION. IF THIS SYMBOL APPEARS ON THE INSTRUMENT, ALWAYS REFER TO THIS OPERATOR GUIDE.

THIS SYMBOL IS USED ON THE EQUIPMENT, OR IN A DOCUMENT, TO WARN THAT THERE ARE POTENTIAL PINCH POINTS. IF THIS SYMBOL APPEARS ON THE INSTRUMENT, ALWAYS REFER TO THIS OPERATOR GUIDE.

WARNING **A warning is given in the document if there is a danger of personal injury or damage to samples or equipment**

Note

Notes give more information about a job or instruction but do not form part of the instruction

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Finesse® is a trade mark of Thermo Shandon Limited

Thermo Fisher Scientific is the trading name of Thermo Shandon Limited

CE

Finesse 325 meets the CE Mark requirements of the In Vitro Diagnostic Directive 98/79/EC

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WELCOME

1 INTRODUCTION

Welcome to the Finesse 325 microtome, a precision microtome intended for use by appropriately trained Laboratory Technicians for the routine sectioning of wax or resin embedded tissue specimens that are subsequently prepared and diagnosed by a pathologist.

Designed and made with care, the instrument is safe to use, simple to operate, and easy to maintain.

This Operator Guide gives instructions for the correct operation and use of Finesse 325.

This instrument is covered by the IVD Directive.

2 SAFETY

THIS PARAGRAPH DETAILS IMPORTANT SAFETY INFORMATION. PLEASE READ THIS SECTION CAREFULLY.

Thermo Fisher products are designed for convenient and reliable operation and to accepted standards of safety. Its use does not entail any hazard if operated in accordance with the instructions given in this manual. However, incorrect actions by a user may damage the equipment, or cause a hazard to health. It is important for you to obey the following safety precautions:

i **All users must read and understand the Operator Guide and only operate the unit in accordance with the instructions. If the instructions are not followed, then the protection provided by the instrument may be impaired.**

ii **Do not modify the instrument - if unauthorised modifications are carried out, the instrument may be made unsafe and the warranty may be invalidated.**

iii **Finesse 325 uses sharp knives. Make sure that you understand the safe and correct methods of using and handling them BEFORE you use the instrument.**

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PRODUCT SAFETY DECLARATION

Part 1 DECONTAMINATION CERTIFICATE

Any instrument, or part of any instrument, must be clean before being returned or before any on-site service, and where necessary accompanied by a completed Decontamination Certificate. If the instrument, or any part of it, is found to be in an unclean condition upon receipt or before a service, or Thermo Fisher Scientific consider it to be a hazard, the instrument or part will be returned unrepaired at the expense of the customer or service will be refused.

In the case of returns, it is important that the certificate is forwarded by post or fax, and a copy attached to the exterior of the container. Containers will not be opened until the company is in possession of the required certificate. This form **MUST** be completed by the customer and **NOT** a Thermo Fisher or distributor employee.

If the instrument or any part of it is to be returned to Thermo Fisher and has been exposed to, or been in contact with potential pathogenic or radioactive material, it is essential that it is decontaminated. For decontamination, reference should be made, where appropriate, to the European Directive 2000/54/EC. To avoid any misunderstanding, we request that all instruments or parts returned to us must be accompanied by a certificate stating the following:

We certify that the instrument:	● has not been exposed to pathogenic, radioactive or other hazardous material and has been cleaned
Model	● has been exposed to pathogenic, radioactive or other hazardous material and has been decontaminated and cleaned according to approved procedures, following exposure to:
Serial No	. . . . .

Has the instrument been used for work with human, or animal, Transmissible Spongiform Encephalopathies, e.g. Creutzfeld-Jacob disease, Scrapie or BSE? If **YES**, please contact Thermo Fisher Service before taking any further action.	**YES / NO**

Signed	Signed . . . . .
Name (Block Capitals)	Company/Organisation . . . . .
Full address	
. . . . .	

Part 2 GUIDELINES FOR RETURNING INSTRUMENTS

Please use the checklist (below left) to ensure that the instrument being returned is ready for collection, then fill in the details (below right).

● All reagents / wax removed from instrument, including vapour traps (if applicable)		RMA NUMBER . . . . .
● Accessories are secured / itemised		CARRIER . . . . .
● Instrument has had transit clamps fitted as detailed in the Operator Guide		FOR ATTENTION OF . . . . .
● Instrument is packed in original packaging		. . . . .

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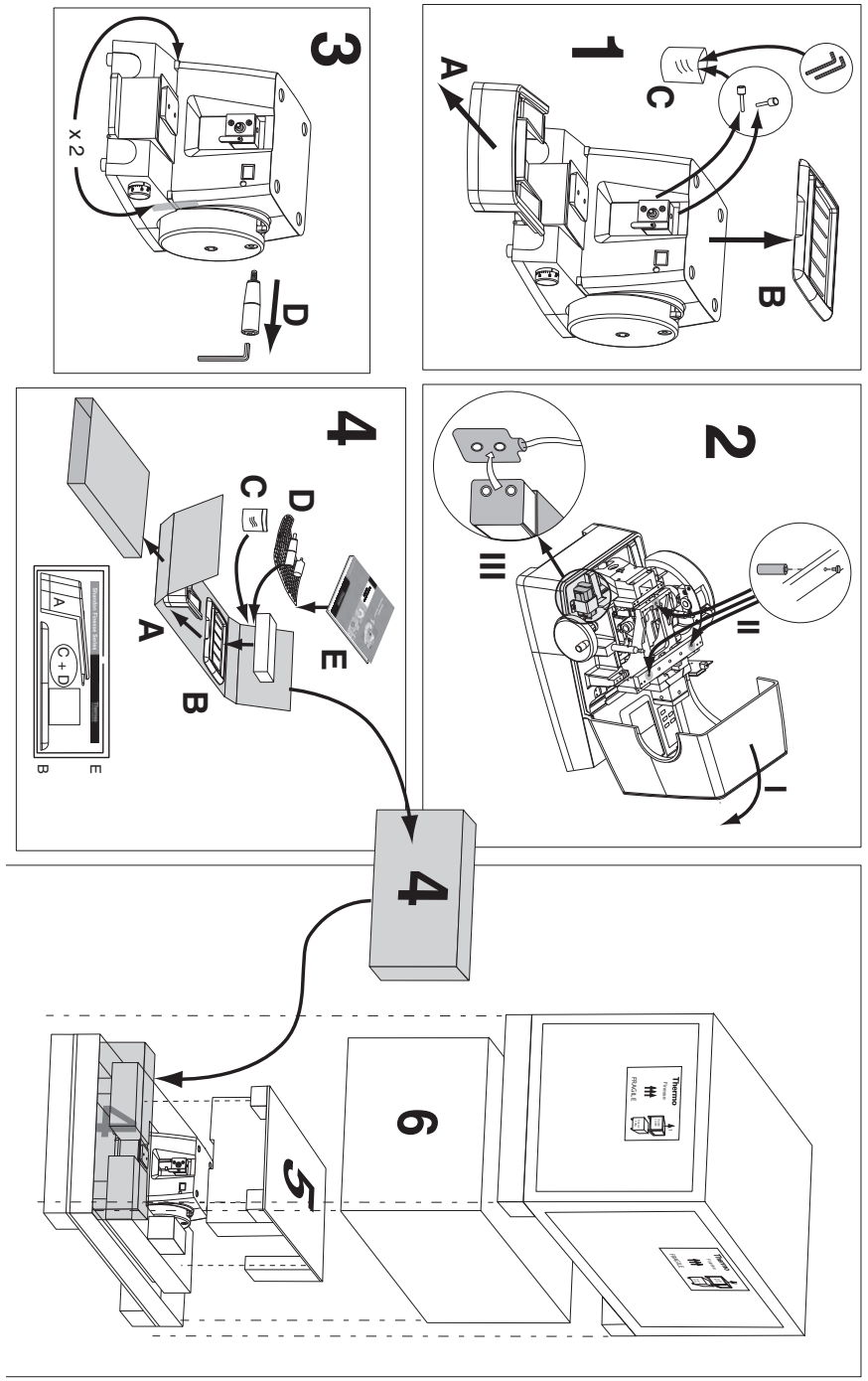
Tel: +44 (0) 1928 534050; Fax: +44 (0) 1928 534049; www.thermo.com/pathology



vii **Always use the knife guards provided to cover the knife when the instrument is not cutting.**

viii **It is important that normal standards of safety and good laboratory practices are employed. Always use common sense and the best known practice when operating the instrument.**

ix **The instrument weighs approximately 40 kilograms (88 lbs); get help to move or lift it.**

x **If the instrument has been used with materials that are toxic or contaminated with pathogenic micro-organisms, follow the cleaning instructions given in Chapter 5. The Product Return Certificate (found in Appendix A) must be completed if the instrument is to be returned to Thermo.**

xi **The instrument should be regularly cleaned as described in Chapter 5 of this Operator Guide.**

xii **Use only factory approved accessories or replacement parts with Finesse 325.**

xiii **Correct maintenance procedures are essential for consistent performance. It is recommended that a Maintenance Contract is taken out with your supplier.**

xiv **The instrument must be serviced annually by a Thermo trained engineer in accordance with the instructions contained in the Finesse 325 Service Manual (A78110101).**

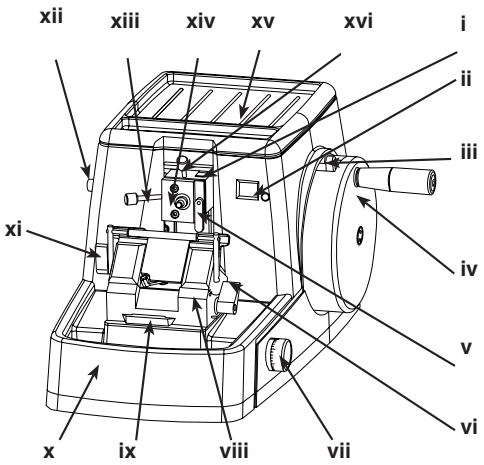
xv **Any problems and queries should be referred to your supplier.**

DESCRIPTION

1.1 OVERVIEW

The Finesse 325 is a precision engineered rotary microtome that comprises the following main components:

- i Available Travel Indicator
- ii Section counter and RESET button
- iii Handwheel Brake
- iv Balanced Handwheel
- v Orientation Head Tilt Clamp Lever
- vi Knife Holder Clamp lever
- vii Section Thickness Control (calibrated 1µm steps 1 - 30µm range)
- viii Knife Holder
- ix Dovetail Slider
- x Debris Tray
- xi Knife Angle Lock lever
- xii Coarse Advance Knob
- xiii Horizontal Tilt Adjuster
- xiv Orientation Head
- xv Top Tray
- xvi Vertical Tilt Adjuster
- xvii Specimen Clamp (not shown)

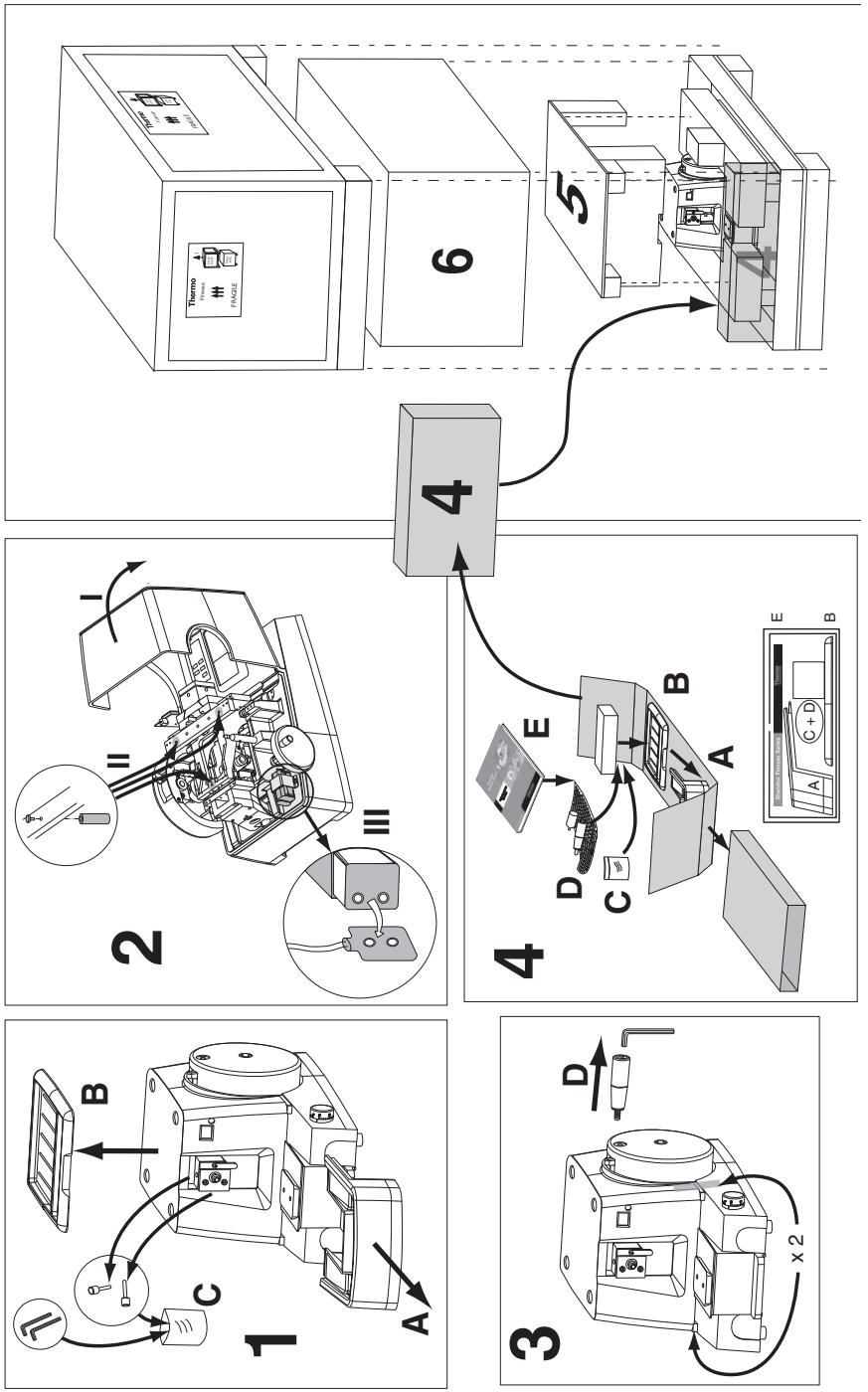


The microtome is designed for general laboratory use and features the unique 'Accu-Feed' system of precision advancement of the specimen without the need for adjustment.

Note

1 Knife Holder to be ordered separately to individual preference.

FINESSE 325 BASIC MICROTOME REPACKING INSTRUCTIONS



APPENDIX A
TRANSPORTATION INSTRUCTIONS

A.1 INTRODUCTION

If the Finesse 325 Microtome is to be serviced or returned to Thermo Fisher, it must be cleaned and decontaminated, and the Product Return Safety Declaration (see page 44) signed by the customer.

If the instrument is to be transported, the transit fixings should be fitted (follow the removal instructions in Chapter 2 in reverse).

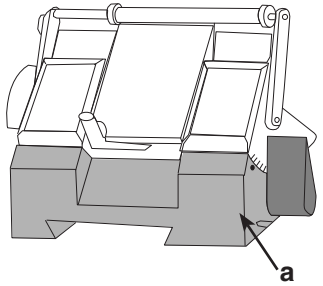
Follow the diagram on page A.2 to repack the Finesse 325 for transportation.

Special design features of the Finesse 325 include the facility for:

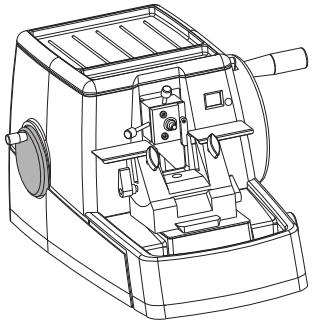
i handwheel braking in any position
ii specimen retraction
iii section counting
iv alarm annunciation at limits of travel
v cutting resin or wax blocks

The Finesse 325 microtome can be used with the following knife holders, in addition to a comprehensive range of accessories from our catalogue.

i Low-profile disposable blade holder
ii High-profile disposable blade holder
iii Universal knife holder type.



The Bottom Stage of the knife holder (a) accommodates both types of Thermo Fisher Top Stage, including type 0318-004, 0321-002 and 0322-002 knife holders.



The Finesse 325 microtome has the Coarse advance knob fitted towards the back of the left hand side panel of the instrument.The Coarse Advance knob turns clockwise for specimen advancement.

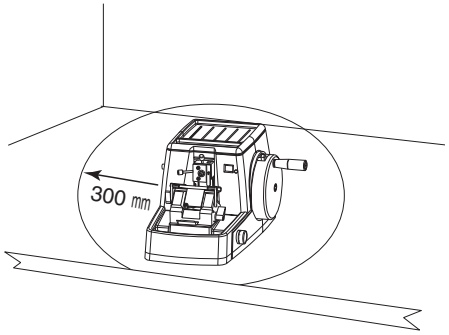
The instrument contains electrically powered components for alarm and display purposes. These devices are powered by replaceable batteries - no mains connections are required.

Routine maintenance of the Finesse 325 microtome requires only that the instrument is kept clean and is routinely lubricated with appropriate oil. Lubrication procedures are provided in Section 6.2 of this Guide.

INSTALLATION AND SETTING UP

2.1 GENERAL

Ensure that sufficient bench space is allocated for the Finesse 325 microtome to enable easy access to the handwheel and the specimen advance and thickness control knobs when in use. It is advisable to allow not less than 300mm (12 inches) radius of space around the instrument.



Inspect the microtome on delivery and make sure that it is undamaged and complete with the components and accessories listed on the packing sheet:

Note

1 See also the list of accessories available - Page 39- and our current catalogue.

Before permanently siting the microtome make sure that the bench will hold 40 kg (88 lbs) dead weight, and will withstand rhythmic mechanical movement of the handwheel. The maximum overall dimensions of the Finesse 325 are:

Width	410 mm	(16½ ins)
Depth	500 mm	(20 ins)
Height	290 mm	(11½ ins)

WARNING **The instrument weighs approximately 40 kilograms (88 lbs). Get help to safely move or lift the instrument without risk of injury.**

DO NOT ATTEMPT TO MOVE ANY CONTROLS OR HANDLES BEFORE ALL TRANSIT FIXINGS ARE REMOVED.

ThermoFisher SCIENTIFIC

The world leader in serving science

Declaration of Conformity

This Declaration of Conformity, issued under our sole responsibility, is only valid when the instrument is used in accordance with the instructions for use.

Manufacturer's Name: Thermo Shandon Limited (Trading as Thermo Fisher Scientific)

Manufacturer's Address: Tudor Road, Manor Park, Runcorn, Cheshire, WA7 1TA UNITED KINGDOM

Product Description: Rotary Microtome

Product Designation: **Finesse® 325**

Part numbers: *A78100001, A78100003, A78100005, A78100103 including accessories supplied as standard, and the following accessories*

Orientation Heads: *0325-105, 0325-113*

Vices: *0201, 0205, 0214, 0215, 0216, 0220, 0313, A78110200, A77510181, 77510178*

Knife Holders: *0318, 0321, 0322, 0318-002, 0318-004, 0321-002, 0322-002, A78110103*

Year of Marking (CE): 2000

This product conforms to the essential requirements of the following directives:

In Vitro Diagnostics Directive 98/79/EC

This product complies with the following International Standards:

EMC: N/A

Safety: IEC 61010-2-101

Issued by: K. Waldron
Quality Manager
Thermo Fisher Scientific
Anatomical Pathology Division

Date: 20 April 2010

Optional accessories considered subject to the In Vitro Diagnostics Directive (IVDD) are specifically identified on this Declaration of Conformity. Further supplies of standard accessories are treated as spares. Convenience aids offered as accessories are not subject to the IVDD.

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Thermo Shandon Limited
Registered Office: 19 Mercers Row, Cambridge CB5 8BZ, UK. Registered in England and Wales – No. 330973

WARRANTY STATEMENT

We are proud of our quality and reliability, and of our after-sales service. We continuously strive to improve our service to our customers.

Please ask your distributor or representative about Service Contracts which can keep your purchase in peak condition for many years to come.

Warranty provisions necessarily vary to comply with differences in national and regional legislation, and you can find details in your delivery documents or from your dealer or representative.

Please note that your warranty may be invalidated if:

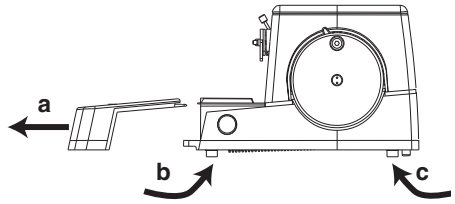
- the instrument is modified in any way,
- accessories and reagents are used that are not approved by Thermo Fisher, or the instrument is not operated or maintained in accordance with the instructions in this Operator Guide.

2.2 UNPACKING

WARNING **The instrument weighs approximately 40 kilograms (88 lbs). Get help to safely move or lift the instrument without risk of injury.**

Put the paletted carton on a strong bench or on the floor. Remove the outer sleeve and box to access the instrument and accessories.

To lift the instrument, make sure that the Debris Tray is not fitted to the instrument. Hold the microtome securely at the lifting positions located under the front *(b)* and rear *(c)* of the instrument.

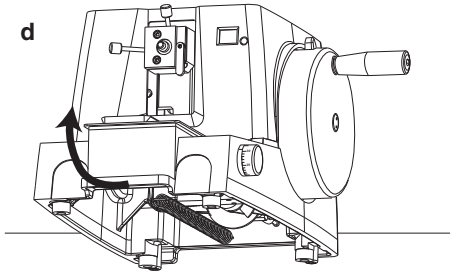


Note

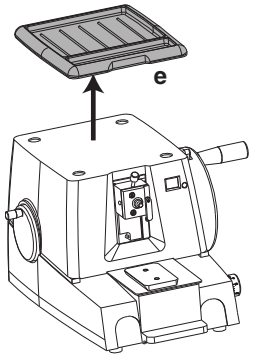
1 To remove the Debris Tray firmly pull it towards you (a).

WARNING **Always remove the Debris Tray to lift or move the Finesse 325. Never lift or move the instrument by the Debris Tray.**

To manoeuvre the instrument once it has been placed on the bench, lift the front of the Finesse 325 (use the front lifting position) so that it sits on the skids at the rear of the instrument *(d)*. The instrument will then be easy to move around the bench.

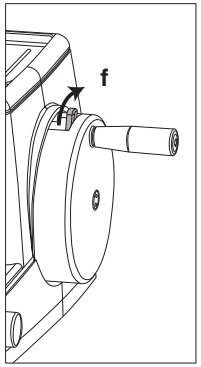


Remove the Top Tray from the instrument *(e)*. Access to the transit fixings is via the outer cover of the instrument. This cover is retained by two spring clips that connect with shaped pillars mounted on the main frame inside.



ALWAYS APPLY THE HANDWHEEL BRAKE BEFORE THE COVER IS REMOVED

To apply the Handwheel Brake, turn the Handwheel until the Orientation Head is at the top of its stroke and then apply the brake by moving the brake lever clockwise, (away from you) *(f)*.



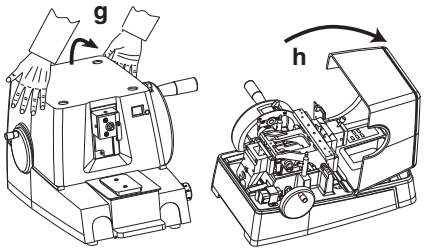
Note

1 *Before the cover is removed, make sure that the Tilt Adjust Screws are removed*

TAKE CARE WHEN THE COVER HAS BEEN REMOVED - MOVING PARTS ARE ACCESSIBLE

WARNING **Electrical wires from the batteries on the main frame connect with the front cover and must be disconnected before the cover can be completely removed.**

To open the outer cover grip it firmly between both hands and tug upwards sharply *(g)*. Pivot the outer cover about its front edge *(h)* to gain access to the electrical connector.



7.2 ACCESSORIES

7.2.1 Standard Equipment

		UK PART NUMBER
4mm A/F Allen Key		P12818
8mm A/F Allen Key		AP14264
Batteries *(fitted)*	(4, AA size Alkaline 1.5V required)	P12740
Cassette Clamp *(Not Basic model. Supplied fitted to Finesse 325)*		0303
Dust Cover *(Not Basic model)*		AP14325
Knife Holder *(to order; Blades/knives supplied separate)*		0321
		0322
		0318
Microtome Oil *(50ml)* *(note - order number in USA is 288)*		1520/1
Operator Guide		A78110100
Orientation Head *(fitted)*		0325-105
Orientation Head Adjuster knob	long *(Supplied, uninstalled)*	0325-103
	short *(Supplied, uninstalled)*	0310-011
Service Manual		A78110101

7.2.2 Accessories

Fixed Head			0325-113
Knives: **C**-profile:	Standard 160 x 34 x 10 mm		2222003
	Steel Knife 240 x 33 x 13 mm		2222005
D-profile	Steel Knife 240 x 34 x 14 mm		2222006
Knife Holders:	Low Profile Disposable Blade Holder		0321
	Blade Holder Top Stage only		0321-002
	High Profile Disposable Blade Holder		0322
	Blade Holder Top Stage only		0322-002
	Simple Knife Holder		A78110103
	Universal Knife Holder		0318
	Universal Knife Holder Base		0318-002
	Universal Knife Holder Top Stage		0318-004
Quick Release Clamps:	Hardboard squares 38 x 38 mm		0205
	Cassette		0303
	Resin Clamp EBH-2 *(fits in 0201 vice)*		A77510181
	Resin Clamp JB4 *(fits in 0201 vice)*		77510178
Specimen Holder	Thin Foil		0223
Vices:	Standard	50 x 45 mm	0201
	Standard	50 x 30 mm	0214
	Standard	25 x 30 mm	0313
Vice Accessories:	'V' spacer for small specimens		0220
	Bar spacer (50 x 10mm)		0215
	'V' spacer for large specimens		0216

See Catalogue for details of additional consumables and accessories.

SPECIFICATION AND ACCESSORIES

7.1 SPECIFICATION

7.1.1 Physical

Main Instrument	Width	410 mm	(16½ ins)
	Depth	500 mm	(20 ins)
	Height	290 mm	(11½ ins)
	Weight	40 kg	(88 lbs)
Mounting		4 rubber feet	

7.1.2 Electrical

Batteries	4 x AA (1.5V Alkaline)

7.1.3 Operational parameters

Specimen advance	1 to 30 µm in 1 µm steps
Specimen coarse advance	200 µm per revolution (clockwise to advance specimen)
Total specimen advance	18mm
Advance between audible limits	16mm
Knife travel	30mm
Specimen stroke	52mm
Knife tilt	0 to 35 degrees (depending on type of knife holder)
Specimen tilt	± 5 degrees with X-Y micro adjust
Specimen retraction	40 - 50 µm

7.1.4 Indicators

Display panels	2 digit LCD (0 - 99) section counter Red-Green-Red visible travel indicator
Push buttons	Counter reset (black)
Alarms	Audible Start and End of Travel

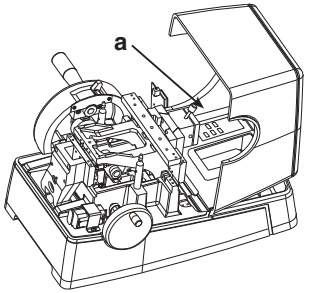
7.1.5 Environment

General	Indoor use only
Temperature *(operation)*	+5°C to +40°C
Temperature *(transit / storage)*	-25°C to +55°C
Relative Humidity	80% max. for temperatures < 31°C decreasing linearly to 50% at 40°C (Non-condensing environment)
Altitude	up to 2000m (6,500 feet)
Pollution degree	2

7.1.6 Instrument Part Numbers

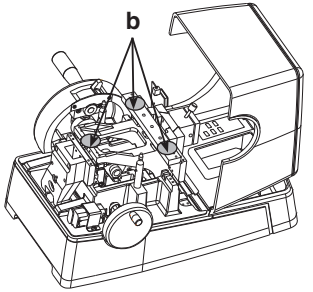
Finesse 325	A78100001
Finesse 325 Basic	A78100005

Undo the connector by gently separating it from the printed circuit board *(a)*.



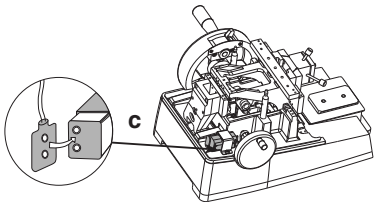
Remove the outer cover completely.

Unscrew each of the three red transit screws *(b)* in turn, and remove the associated red transit pillars.



DO NOT DISCARD THE TRANSIT FIXINGS. RETAIN THEM IN A SEALABLE POLYTHENE BAG FOR FUTURE USE. (NOTE THAT THE SCREWS CAN BE REFITTED AND KEPT IN SITU IF REQUIRED - MAKE SURE THAT THEY ARE SECURELY SCREWED INTO PLACE)

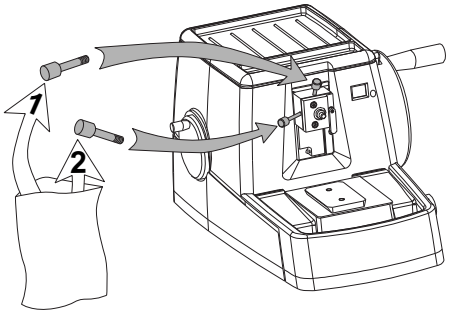
Locate the battery connector *(c)* and make sure that it is correctly orientated before fitting it on the battery pack.



Return the outer cover to an upright position at the front of the microtome and re-make the electrical connections to the printed circuit board.

Fit the outer cover in position and press down firmly until it snaps into place on the spring clips.

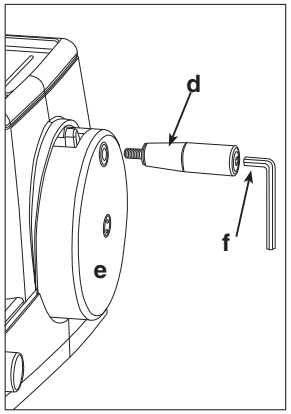
Find the tilt adjuster screws 1 and 2 in the bag of accessories and screw them into position on the Orientation Head. The shorter screw (screw 1) fits in the top hole and adjusts the vertical tilt angle of the Orientation Head; the longer screw (screw 2) fits in the hole in the left hand side of the Orientation Head and adjusts the horizontal angle.



Note

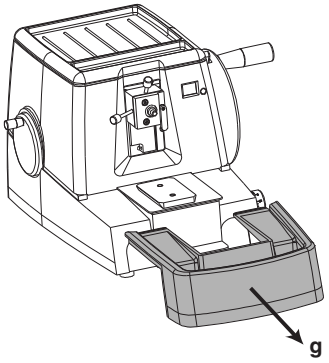
1 The tilt adjusting screws must always be removed before removing or refitting the cover.

Fit the Handwheel handle *(d)* to the Handwheel *(e)* using the large Allen key supplied *(f)*.



To fit the Debris Tray, hold the tray anywhere around its edge and line it up with the front of the instrument under the Knife Holder. Push it firmly into position until it clicks into place.

To remove the Debris Tray firmly pull it towards you *(g)*.



Note

1 Always remove the Debris Tray to lift or move the Finesse 325.

WARNING **Do not lift or move the instrument by the Debris Tray.**

TABLE 1 (Continuation)
- PROBLEMS WHEN SECTIONING WAX EMBEDDED SPECIMENS

SYMPTOM	CAUSE	REMEDY
Sections excessively compressed.	1 Knife blunt. 2 Knife bevel too wide. 3 Wax not hard enough, hot specimen, or ambient conditions. 4 Cutting too fast.	1 Sharpen knife or change blade. 2 Regrind or sharpen to produce secondary narrow bevels. 3 Use higher melting point wax, or cool block with ice. 4 Cut more slowly.
Expansion and disintegration of sections on water surface.	1 Poor specimen impregnation. 2 Water temperature too high.	1 Return specimen to a vacuum impregnation bath for a few hours. 2 Cool water.
Sections coil up instead of keeping flat on knife.	1 Knife blunt. 2 Rake angle too small. 3 Section thickness too large for type of wax.	1 Sharpen knife or change blade. 2 Reduce cutting angle by re-sharpening, or, if clearance angle is excessive, reduce the tilt of the knife. 3 Reduce the thickness of the section, or use wax with a slightly higher melting point. Raise temperature of the block by breathing on sections as they are cut.

TABLE 1 (Continuation)
- PROBLEMS WHEN SECTIONING WAX EMBEDDED SPECIMENS

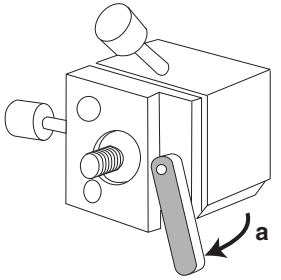
SYMPTOM	CAUSE	REMEDY
Sections split or scored perpendicular to the knife edge.	1 Nick in edge of knife. 2 Specimen contains hard particles. 3 Wax contains hard particles.	1 Sharpen knife or use different area of blade. 2 If calcium deposits, de-calcify. 3 Re-embed using fresh, filtered wax.
No joining of sections to form a ribbon.	1 Wax too hard. 2 Debris on knife edge. 3 Knife angle too sharp or shallow. 4 Uneven edges of block. 5 Mould release or detergent.	1 Re-embed in lower melting point wax, or breathe on block to soften. 2 WEAR MESH GLOVES and clean with rag moistened in wax solvent. 3 Adjust to optimum angle. 4 Use scalpel to straighten leading or trailing edges until parallel. 5 Wipe around edge of block with absorbent paper.
Attachment of sections to block on return stroke.	1 Insufficient clearance angle. 2 Debris on edge of knife. 3 Debris on edge of block. 4 Static electricity on ribbon.	1 Increase clearance angle. 2 WEAR MESH GLOVES and use cloth moistened in wax solvent and clean carefully. 3 Use a scalpel to trim the edge of the block. 4 Earth the Microtome to a water tap or approved contact. Ionise air near the knife using an ioniser. Place a basin or tray of water near to the knife to humidify the air.
Areas of specimen in block not in wax.	1 Incomplete impregnation of the specimen. 2 Wax becoming detached from the Specimen Holder.	1 Return specimen to vacuum impregnating bath for a few hours, or re-process if the fault is excessive. 2 Re-attach with hot spatula.

2.3 THE SPECIMEN CLAMP

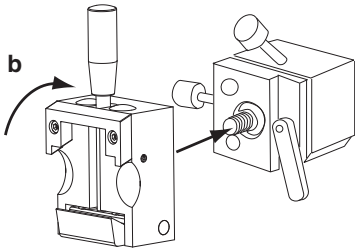
ALWAYS APPLY THE HANDWHEEL BRAKE BEFORE ADJUSTING THE SPECIMEN CLAMP.

To remove the knife holder pull the Knife Holder Clamp Lever toward you and slide the knife holder off the dovetail. Remove the knife holder to a safe place.

Push the Tilt Clamp lever downward to lock *(a)*.

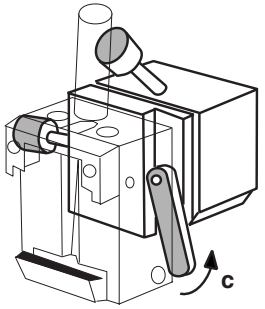


Fit the Specimen Clamp on the threaded bolt at the end of the Orientation Head, then screw it clockwise to tighten it in position *(b)*.



Loosen the Tilt Clamp lever *(c)* by moving it upward, then align the Specimen Clamp to suit. You can rotate the Specimen Clamp through 360° to obtain the best setting. Use the Vertical and Horizontal tilt knobs to adjust the orientation of the Specimen Clamp.

Push the Tilt Clamp lever downward to lock the assembly in its correct position.



Notes

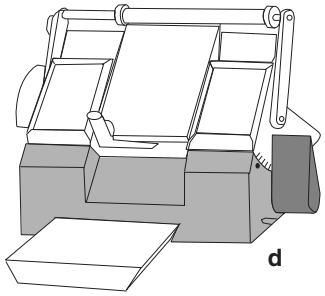
1 *The Quick Release Cassette Clamp type of Specimen Clamp is shown. Other types of Specimen Clamp, including vices, fit in the same manner.*

2 *Always lock the Specimen Clamp firmly in position after adjustment. A loose Clamp can damage both the specimen and the knife.*

3 *Some instruments are fitted with a Fixed Head where the threaded bolt is locked in position by a pin. To adjust this pin release the M5 Hex socket screw on the right hand side of the Fixed Head.*

2.4. KNIFE HOLDER

The Knife Holder base slides backwards and forwards along a dovetail slider on the bed of the instrument. A Knife Clamp Lever on the right hand side locks the base to the dovetail when pushed away from you *(d)*.

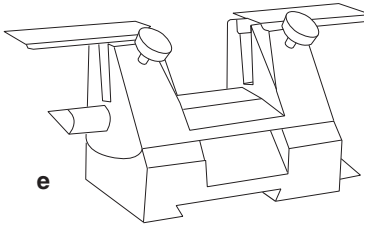


Note

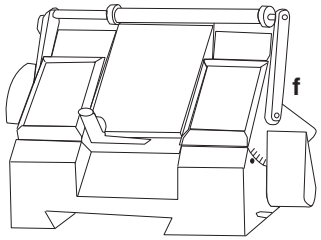
1 *If the base of the Knife Holder does not clamp up correctly, set the Knife Clamp lever at about 45° before the locked position. Tighten the socket screw in the end of the lever so that the Knife Holder just grips the dovetail.*

2 *If the Knife Holder does not fit on the dovetail, slacken the socket screw and try again. Adjust the socket screw as above to obtain correct clamping.*

The **0318 Universal Knife Holder** *(e)* is suitable for use with the range of knives listed in Section 8.2 (Page 8.2) - Spares and Accessories List.



The **0321 Disposable Blade Holder** *(f)* optimises the performance of low profile disposable blades with complete safety for the operator.



The **0322 Disposable Blade Holder** is designed for use with High profile disposable blades.

TROUBLESHOOTING

Correct service and maintenance is essential for the long term serviceability of precision engineered products such as the Finesse 325 Microtome. We strongly recommend that a Thermo Fisher Service Contract is used to ensure future reliability, and consistency of performance.

This instrument is designed for maximum safety, ease of use, and reliability. It should only be serviced and set up by a qualified Thermo Fisher Service Engineer. The most common causes of poor quality sectioning are due to technique. Some typical problems, and their remedies, are listed in Table 1 - PROBLEMS WHEN SECTIONING WAX EMBEDDED SPECIMENS.

TABLE 1 - PROBLEMS WHEN SECTIONING WAX EMBEDDED SPECIMENS

SYMPTOM	CAUSE	REMEDY
Ribbon of section is curved.	1 The leading and trailing edges of the block are not parallel 2 One area of the knife or blade is blunt. 3 Surplus wax on one side of block. 4 Variation in consistency of specimen.	1 Use a scalpel to trim the edges of the block until parallel. 2 Sharpen knife or use different part of blade. 3 Reduce excess wax. 4 Turn block through 90º and cool with ice. Mount sections individually.
Sections alternate between thick and thin.	1 Wax not hard enough for the conditions 2 Block or knife is loose. 3 Insufficient clearance angle. 4 Faulty mechanism in Microtome. 5 Trying to cut too thin a section.	1 Use higher melting point wax, or cool block with ice. 2 Tighten. Clean Specimen Holder 3 Slightly increase the angle. 4 Check for obvious faults. 5 Stay within thickness range appropriate to embedding medium.
Chatters - Thick and thin areas parallel to the knife edge.	1 Block or knife loose in holder. 2 Knife angle too steep or sharp. 3 Specimen too hard for current conditions. 4 Calcified areas in tissue. 5 Knife blunt.	1 Tighten block or knife. 2 Reduce angle to minimum, with clearance. 3 Use heavy duty knife. Reduce knife slant angle. Soften tissue with softening fluids. Re-process/re-embed specimen. 4 Decalcify the surface or de-hydrate then de-calcify. 5 Sharpen knife or change blade.

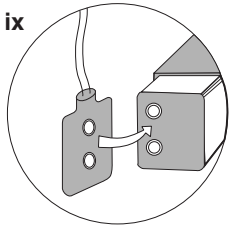
regulations.

vii Use four new Alkaline AA size 1.5V batteries and install them correctly in the battery assembly.

WARNING **Make sure that the polarity of the batteries is correct or you may damage the instrument**

viii Refit the battery holder in the clamp and tighten the clamp screws.

ix



ix Plug in the adapter cable to the battery holder.

x Use the COARSE ADVANCE control to move the Specimen Head to an 'end of travel' position. Check that the alarm operates then move the Specimen Head to within its operating range.

xi Replace the cover.

xii Refit the tilt adjuster knobs.

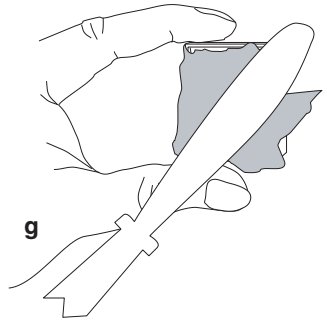
Note

1 The Knife Holder base accepts the 0318-004 Universal Knife Holder, and 0321-002 and 0322-002 Disposable Blade holders.

ALWAYS REMOVE THE KNIFE AND APPLY THE HANDWHEEL BRAKE BEFORE THE KNIFE HOLDER IS REMOVED

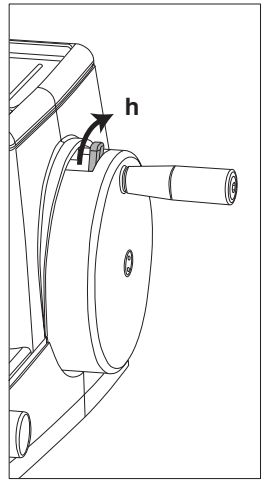
2.5 SETTING UP PROCEDURE

It is important that the instrument is always kept clean and free from wax build-up on and around the Specimen Clamp.



It is also important to ensure that the instrument is correctly set up as instability of the specimen, the cassette, the Specimen Clamp, the blade, or the Knife Holder seriously affects the quality of sections.

Use a scraper, plastic spatula or ParaTrimmer to remove excess wax from the sides, ends, and back of the cassette *(g)*. The cassette must be able to mount squarely on the Specimen Clamp.

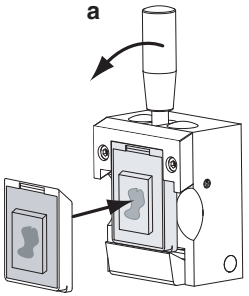


Turn the handwheel until the handle is uppermost (at the 12 o'clock position) *(h)*. Move the brake lever fully clockwise and test to ensure that the brake is on.

ALWAYS APPLY THE HANDWHEEL BRAKE BEFORE WORKING WITH THE SPECIMEN CLAMP.

Check that the Specimen Clamp is clean and free of wax deposits so that it can hold the cassette securely on the Specimen Clamp.

On the Cassette Clamp pull the quick release lever forward to release the jaws. Put the cassette in the jaws of the clamp and release the lever *(a)*. Check that the cassette sits squarely and securely in the clamp.



2.6 SPECIMEN ORIENTATION

If the specimen on the cassette is not lying at a suitable angle for sectioning, you can compensate by use of the Orientation Head controls.

Push the Tilt Clamp Lever up to release the Head, then adjust the Vertical Tilt and Horizontal Tilt Controls independently or together until the specimen is at the optimum angle for sectioning.

When the specimen is at a suitable angle with respect to the blade, push the Tilt Clamp Lever firmly down to lock the Orientation Head in the set position.

2.7 TO FIT A SOLID KNIFE

MICROTOME BLADES ARE EXTREMELY SHARP AND CAN CAUSE SERIOUS INJURY. ALWAYS HANDLE MICROTOME BLADES WITH GREAT CARE. MESH GLOVES PROVIDE SOME PROTECTION WHEN SHARP OBJECTS ARE HANDLED.

STORE ALL BLADES IN THEIR TRANSPORT BOXES WHEN NOT REQUIRED FOR IMMEDIATE USE.

iii Turn the COARSE ADVANCE control to move the Specimen Head, from its fully returned position to fully advanced, to spread the oil along the leadscrew.

iv Carefully lower the instrument to its normal position.

5.3 BATTERY REPLACEMENT

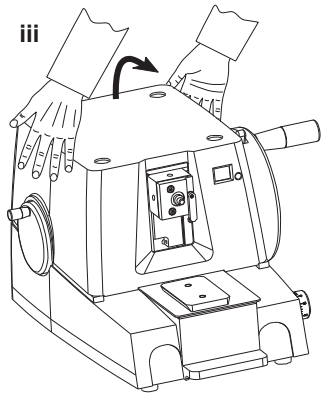
The batteries provide power for the section counter and the ‘end of travel’ alarm. They discharge quickly if the alarm is allowed to operate for a long time.

Replace the batteries if the alarm fails to operate, or if the display becomes dim or is not visible. To replace the batteries:

i Release the handwheel brake and turn the handwheel until the Specimen Clamp is at the lowest part of its travel. Re-apply the brake.

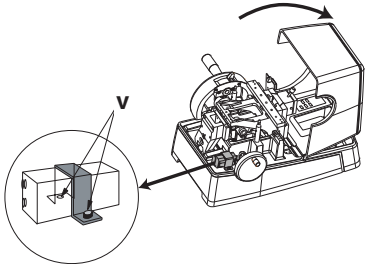
ii Unscrew and remove the Horizontal and Vertical tilt adjuster knobs.

iii Remove the instrument cover by lifting from the rear.



iv Unplug the adapter cable from the battery holder.

v Use an Allen key to undo the two screws that hold the battery holder clamp.



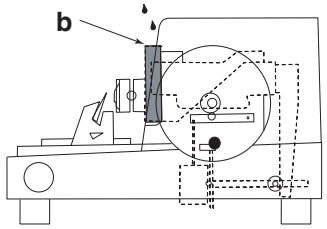
vi Remove the expired batteries and dispose of them in accordance with local

5.2 LUBRICATION

Moving parts of the Finesse 325 Microtome require regular lubrication with the Microtome Oil supplied with the instrument. Set a schedule for routine lubrication on the following basis.

DAILY

Apply one drop of microtome oil to the vertical dovetail slider for the Specimen Head *(b)* at the end of each daily session. Do this as follows while the cover is still in place (the slider is clearly visible through the front opening of the cover).



i Release the handwheel brake and turn the handwheel until the Specimen Clamp is at the lowest part of its travel.

ii Apply one drop of Microtome Oil to the top side of each side of the slide.

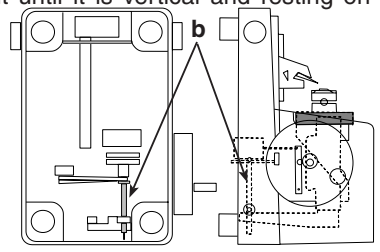
iii Turn the handwheel to distribute the oil along the length of the dovetail slider.

MONTHLY

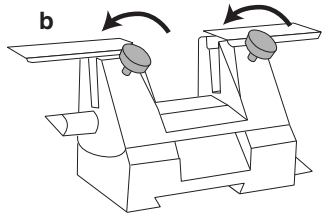
The leadscrew is very finely threaded and at first sight can appear to be a solid shaft. Its duty is to advance the Specimen Head as the handwheel is rotated. Occasionally wipe away excess oil and accumulated dust then lubricate as follows:

i Lift the instrument bodily from the front until it is vertical and resting on its rear plane.

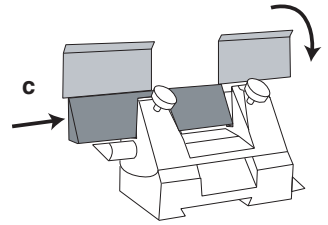
ii Apply two to three drops of Microtome Oil along the visible part of the leadscrew *(b)*.



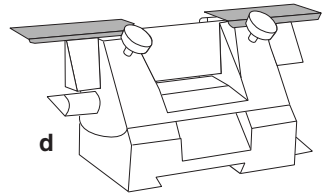
Loosen the two Knife Clamp Screws at the front of the Solid Knife Holder by turning them anti-clockwise *(b)*.



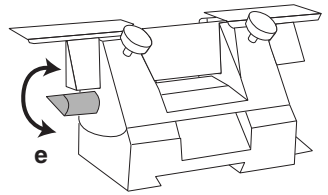
Slide the knife into position under the Knife Clamps *(c)*, then tighten both Knife Clamp Screws by turning them clockwise .



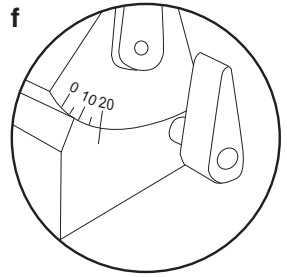
Make sure that the two Knife Guards are in position over the knife *(d)*.



Turn the Knife Angle Lock Lever *(e)* to release the Knife Holder from the Base.



Tilt the Knife Holder with respect to the Base until the 20 graduation line aligns with the reference marker on the scale at the right hand side of the Knife Holder *(f)*. This is an approximate 20° angle suitable for a new 'C' profile steel blade.



Lock the Knife Holder at the set angle by pushing the Knife Angle Lock Lever away from you.

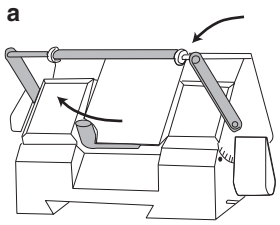
Note

1 *These are the recommended settings. You may need further minor adjustments to obtain optimum results.*

FOR SAFETY MAKE SURE THAT THE KNIFE GUARDS ARE IN POSITION

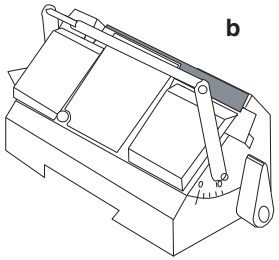
2.8 TO FIT DISPOSABLE BLADES

Release the Blade Clamp Plate by moving the Clamp Lever fully left (clockwise) pull back the Flip Up Knife Guard *(a)*.

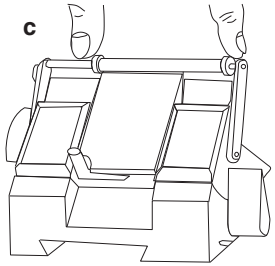


MICROTOME BLADES ARE EXTREMELY SHARP AND CAN CAUSE SERIOUS INJURY. ALWAYS HANDLE MICROTOME BLADES WITH GREAT CARE. MESH GLOVES PROVIDE SOME PROTECTION WHEN SHARP OBJECTS ARE HANDLED.

STORE ALL BLADES IN THEIR TRANSPORT BOXES WHEN NOT REQUIRED FOR IMMEDIATE USE.



Slide the blade a sufficient distance from its dispenser to enable one end to be inserted in the Knife Holder, then withdraw the dispenser leaving the blade in position *(b)*.

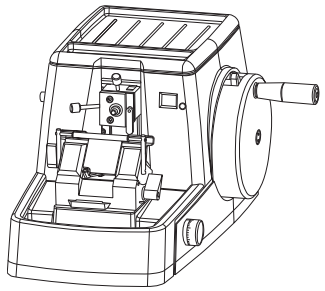


Place the Flip-Up Knife Guard over the blade. Hold the Knife Guard *(c)* by its two flanges and slide it sideways until the blade engages between these flanges. Use the

CLEANING AND MAINTENANCE

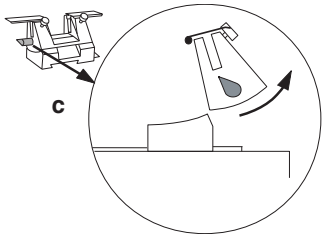
5.1 INTRODUCTION

ALWAYS REMOVE THE KNIFE OR BLADE BEFORE CLEANING OR MAINTAINING THE MICROTOME



Clean the instrument regularly as part of your normal housekeeping routine, paying particular attention to the removal of wax from the area around the Knife Holder. Always remove the knife or blade, apply the handwheel brake, and lock the Knife Holder on its dovetail slide before starting any maintenance.

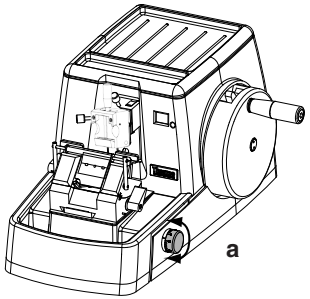
Use a household spray cleanser, and a dry polishing cloth, to clean the body and cover of the instrument as necessary. Alternatively, use a cloth damped in soapy water, then polish with a dry cloth. DO NOT USE EXCESSIVE WATER



To clean the Knife Holder of residual wax, remove it from its base by loosening the tilt lock, then slide the Knife Holder towards you *(c)*. Use an appropriate wax removing solvent to clean away all traces of wax, then apply a thin coating of microtome oil to prevent corrosion.

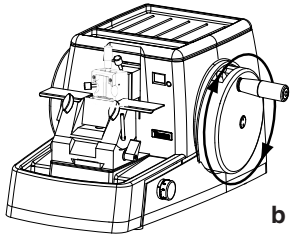
4.4 SECTIONING

When trimming is complete and the specimen presents a clean smooth surface to the knife, set the THICKNESS control *(a)* to the desired setting within the range 1 - 30 µm.



Release the handwheel brake and turn the handwheel clockwise until the handle of the handwheel is in the 2 o'clock position, and the specimen is just about to be cut.

One complete revolution of the handwheel is required for each section *(b)*. Sectioning is best performed by turning the handwheel clockwise slowly and at an even speed from the 2 o'clock position and round to 2 o'clock again. Turning the handwheel at too high a speed can compress the specimen, and cause poor ribbon adhesion.



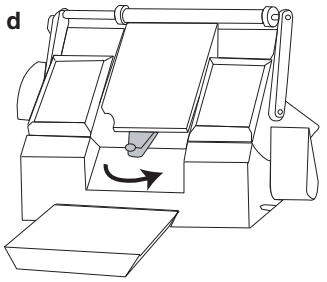
Return the handle to the 12 o'clock position and apply the brake when sectioning is finished. The LCD counter displays the number of cutting cycles performed within the range 1-99. Press the small button adjacent to the display to reset the counter.

When using embedded specimen blocks of a similar size it is good practice to leave the knife holder in its set position and to use the COARSE ADVANCE control to position each new specimen above the knife for cutting. This ensures that there is usually adequate travel available.

Note

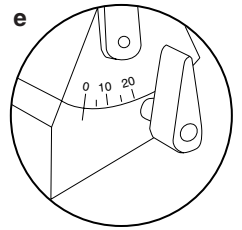
1 *An alarm sounds when the specimen is at the limits of travel although in practice it is possible to work a little way beyond them. A safety trip prevents the specimen moving too far forward.*

Knife Guard, with the blade located between the flanges, to move the blade into its cutting position. Only touch the flanges when moving the Knife Guard - do not grip the centre shaft.



Push the Blade Clamp to the right (anti-clockwise) to lock the blade firmly in its cutting position *(d)*.

When using Low Profile disposable blades, set the tilt angle of the Knife Holder to Zero on the scale *(e)*. Pull the Knife Angle Lock Lever towards you to release the Knife Holder from the Base, then make the adjustment. Lock the Knife Holder in position by pushing the Lock Lever away from you.



Note

1 *These are the recommended settings. You may need to make further adjustments to obtain optimum results.*

ALWAYS REMOVE THE BLADE BEFORE REMOVING THE KNIFE HOLDER FROM THE MICROTOME

Notes

1 *Always make sure that the blade support and clamp plate are free from wax or debris before fitting a new blade.*

2 *The top edges of the blade holder and the Clamp Plate are easily damaged which may result in poor sectioning. Take care when fitting blades or making adjustments. Do not allow the Specimen Clamp to make contact with these components.*

3 *Make sure that the blade is properly seated before closing the Clamp Plate.*

4 *Make sure that all clamping levers are fully locked before starting sectioning. Poor clamping may result in chatter or uneven sectioning.*

2.9 STORAGE

Note

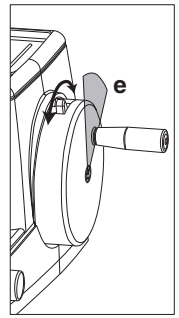
1 *Remove the blade completely if the instrument is not going to be used in the near future.*

Make sure that the microtome is stored correctly when it is not required for immediate or regular use. Remove the batteries and fit the dust cover.

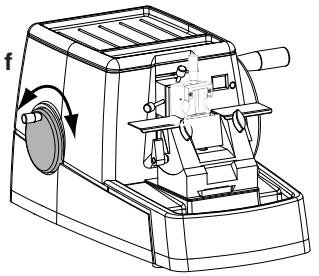
The storage area must be dry and at normal room temperature. DO NOT store in cold or damp areas.

Make sure that the instrument is properly cleaned and lubricated before committing it to long term storage.

4.2 TRIMMING

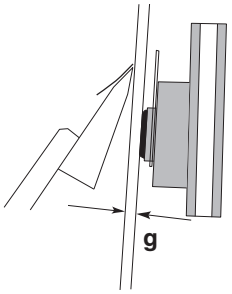


Release the brake and slowly turn the Handwheel clockwise. Each time the handle of the handwheel moves from the 12 o'clock position to the 1 o'clock position *(e)*, turn the Coarse Advance Knob *(f)* approximately one eighth of a turn to advance the specimen toward the knife by approximately 25 microns.



Continue turning the handwheel and advancing the specimen until clean sections of the specimen are taken. Apply the handwheel brake when trimming is completed and the specimen presents a clean smooth surface to the knife.

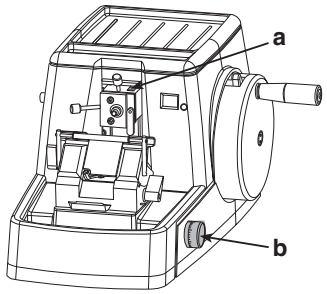
4.3 RETRACTION



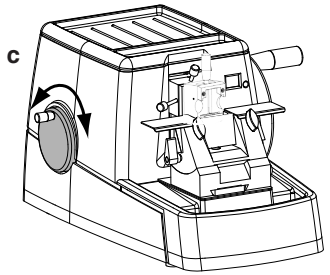
The specimen is withdrawn approximately 40µm behind the cutting plane as the Handwheel handle passes from the 6 o'clock to 12 o'clock positions. This retraction is cancelled as the handwheel passes the 12 o'clock position, and the specimen returns to the cutting plane. If you advance the specimen to the cutting plane while the handwheel is between 6 o'clock and 12 o'clock, then an excessively thick section (40µm+) will be taken during the next cutting stroke *(g).*

WARNING **It is important that the Handwheel handle is between 12 o'clock and 1 o'clock before the coarse advance is used to avoid premature wear on the ratchet mechanism**

A visible indicator *(a)* shows green when the instrument is within its permissible range of travel, and changes to red when the end of travel limits are being approached. An audible alarm sounds when an end of travel limit is reached.

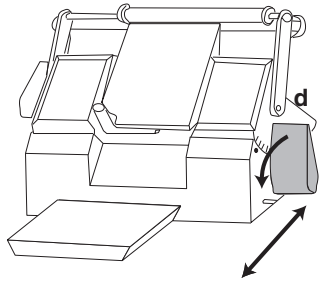


To make the maximum specimen travel available before starting a session of sectioning, turn the Coarse Advance Knob *(c)* to move the specimen head backwards. When only red shows on the indicator on top of the specimen arm *(a)*, the end of travel is near in the rewind direction. The alarm sounds when the limit is reached.



Silence the alarm when the end of travel limit is reached by moving the specimen head to within the normal operating range. Use the Coarse Advance Knob *(c)* to do this.

When maximum travel is available, use the Knife Holder Clamp Lever *(d)* to loosen the knife holder on its carriage. Move the knife as close as possible to the specimen without actually being in a position to make a cut during the first cutting stroke. Push the Knife Holder Clamp Lever away from you to lock the knife in this position.



During normal operation the specimen advances by the distance set by the Section Thickness Control *(b)* as each successive section is cut. The maximum travel available is 16mm. During the course of specimen travel the indicator shows red with green when travel is available in both directions.

The indicator shows red - green - red when the limit of travel is approached in the advance direction. The alarm sounds when the limit is reached.

CONTROLS

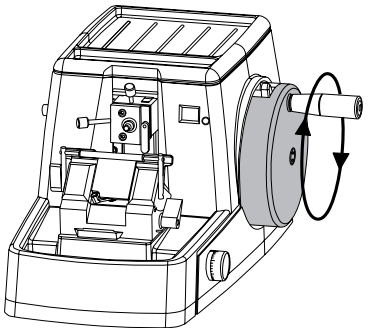
3.1 DESCRIPTION

The controls of the Finesse 325 Microtome are all mechanically operated. A battery powered printed circuit provides a section counting and display facility, and a 'Start/'End-of-Travel' audible alarm.

3.2 INSTRUMENT CONTROLS

HANDWHEEL

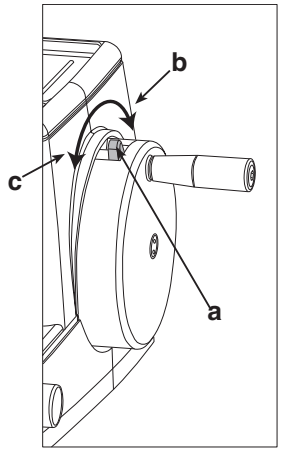
Clockwise rotation of the Handwheel moves the specimen across the knife blade to take sections. It is balanced for smooth and easy operation and performs a cutting stroke each time the handle moves through the 1 o'clock to 5 o'clock sector. The return stroke of the Specimen Head is completed as the handle moves through 6 o'clock to 12 o'clock.



The specimen is retracted from the knife edge during the return stroke to prevent the specimen brushing against the back of the knife blade.

BRAKE

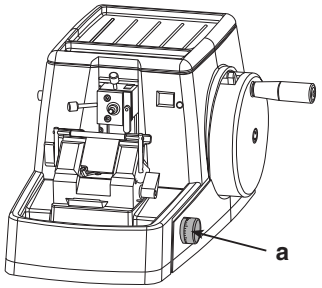
The brake *(a)* operates to prevent movement of the Specimen Head by acting on the Handwheel. It engages when moved clockwise (away from you) *(b)*, and disengages when moved anti-clockwise (towards you) *(c)*. The brake operates through 360° of Handwheel travel.



ALWAYS APPLY THE BRAKE BEFORE ADJUSTING THE SPECIMEN CLAMP OR KNIFE HOLDER WHENEVER YOUR HAND IS NOT ON THE HANDWHEEL.

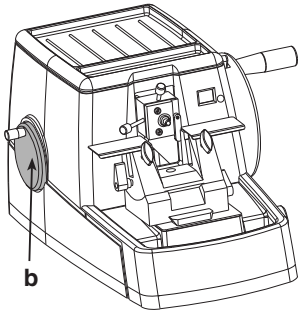
SECTION THICKNESS CONTROL

This is a rotary control located at the front of the right hand side *(a)*. It provides means for adjusting the incremental advance of the specimen after each cutting stroke. The control range is between 1 - 30 µm in steps of 1µm.



COARSE ADVANCE KNOB

Turn the Coarse Advance Knob *(b)* one complete revolution clockwise to advance the specimen 200 µm towards the blade



3.3 SPECIMEN CONTROLS

Specimens are normally held on cassettes by wax or resin. The cassette mounted specimen is then held in a Specimen Clamp attached to an Orientation Head in readiness for sectioning. Alternatively, a Specimen Vice is available for specimens not held in a cassette. Four controls are associated with this assembly.

ALWAYS APPLY THE HANDWHEEL BRAKE BEFORE ADJUSTING THE SPECIMEN CLAMP OR VICE

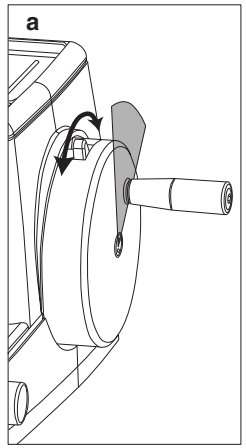
SPECIMEN CLAMP

The Specimen Clamp assembly can comprise either a Cassette Clamp or a Vice.

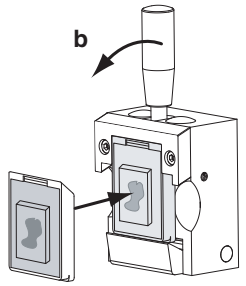
OPERATION

4.1 INTRODUCTION

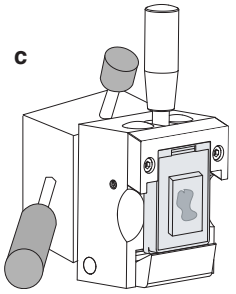
MAKE SURE THAT THE HANDWHEEL BRAKE IS APPLIED BEFORE MOUNTING A SPECIMEN



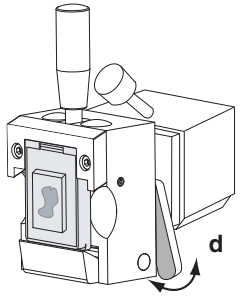
If necessary release the brake and rotate the handwheel until the handle is just at the 1 o'clock position, then re-apply the brake *(a)*.



On the Cassette Clamp pull the quick release lever forward, insert the cassette, and release the lever *(b)*. Check that the cassette is clamped firmly.



Use the vertical and horizontal tilt controls as appropriate to orientate the specimen correctly with respect to the knife edge *(c)*.



Lock the orientation head in position when the optimum orientation is obtained *(d)*.

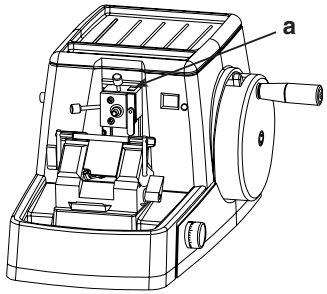
The display is reflective and requires some ambient light to be visible. If the display is dim or not visible the batteries probably need replacing.

3.6 WARNINGS

Audible and visible warnings are incorporated in the Finesse 325 Microtome. The audible warning is an alarm sounder that operates when the specimen is at the limit of travel in both the forward (advance) and reverse (rewind) directions.

Do not allow the alarm to operate for a long time as this will discharge the battery prematurely Move the specimen away from the end of travel limit using the COARSE ADVANCE control to silence the alarm.

A coloured marker *(a)* on top of the specimen arm gives a visible warning when near the 'end of travel'. View from the top of the instrument.

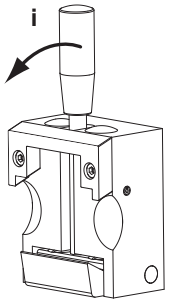


i **Red bar** - A single red bar indicates that the limit of travel in the return (rewind) direction is approaching.

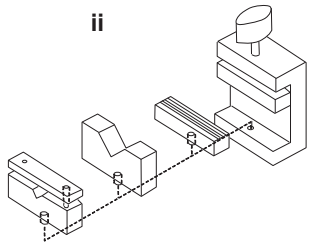
ii **Red and Green -** As long as green is nearest to the cover, then travel is available in both the advance and rewind directions.

iii **Red Green Red -** When a red band is visible between the green band and the cover, then this indicates that the limit of travel in the forward (advance) direction is approaching.

i The Cassette Clamp has a quick release lever that pulls forward to slacken the lower jaw. The cassette then fits either vertically or horizontally under the top jaw so that as the lever is released the jaws close under spring pressure to clamp the cassette in position.



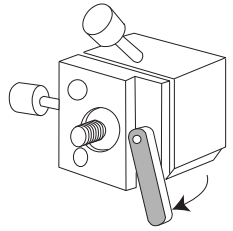
ii The Vice is operated by a butterfly knob that moves the upper jaw vertically to clamp the specimen against a lower jaw. Inserts are available to adjust to different specimen sizes and profiles.



Both types of Specimen Clamp attach to the Orientation Head in the same manner as described in section 2.3.

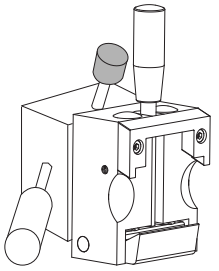
TILT CLAMP LEVER

This is located at the front of the Orientation Head. When pushed up the Orientation Head is unlocked to allow the specimen to be set using the Vertical and Horizontal Tilt Controls. When pushed down it locks the Orientation Head in position to prevent movement of the specimen during sectioning.

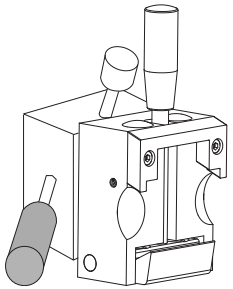


VERTICAL TILT CONTROL

The Vertical Tilt Control protrudes from the top surface of the Orientation Head. Turning this control moves the Specimen Clamp, and hence the specimen, through a vertical arc.



HORIZONTAL TILT CONTROL
Similar to the Vertical Tilt Control but mounted on the left face of the Orientation Head the Horizontal Tilt Control moves the specimen through a horizontal angle when rotated. When operated in conjunction with the Vertical Tilt Control it enables the attitude of the specimen to be set to the optimum angle for sectioning.

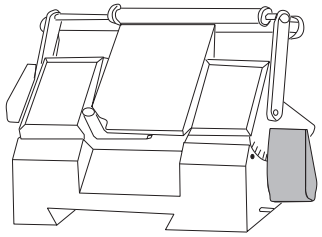


3.4 KNIFE CONTROLS

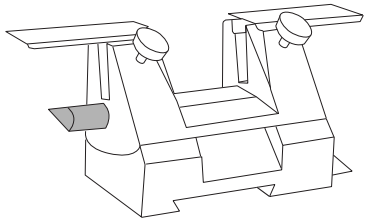
The controls of both the Universal Knife Holder and the Disposable Blade Holder are similar with respect to means for setting. The setting procedures for both types of blade are described separately.

THE KNIFE IS EXTREMELY SHARP, AND COULD CAUSE SERIOUS INJURY IF MISHANDLED. ALWAYS WEAR MESH GLOVES WHEN HANDLING A KNIFE.

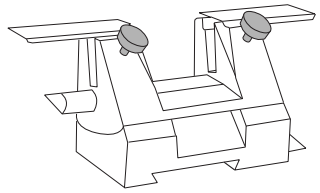
KNIFE HOLDER CLAMP LEVER
The Clamp Lever is situated on the right hand side of the base. When pushed away from you it locks the knife holder on the dovetail slider to prevent movement with respect to the specimen. Pull towards you to release.



KNIFE ANGLE LOCK LEVER
The tilt angle of the knife blade is adjustable when this lever is released. Pull towards you to release, and push away from you to lock. The tilt angle is shown on the scale at the right hand side of the Knife Holder.

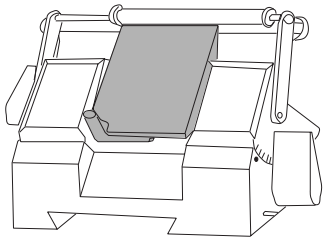


CLAMP SCREWS (Universal Knifeholder)
Two screws are provided to clamp blades in position. Turn anti-clockwise to undo; clockwise to tighten.

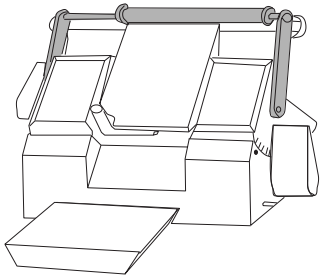


MICROTOME BLADES ARE EXTREMELY SHARP AND CAN CAUSE SERIOUS INJURY. ALWAYS HANDLE MICROTOME BLADES WITH GREAT CARE. MESH GLOVES PROVIDE SOME PROTECTION WHEN SHARP OBJECTS ARE HANDLED. USE THE DISPENSER WHEN FITTING A NEW BLADE.

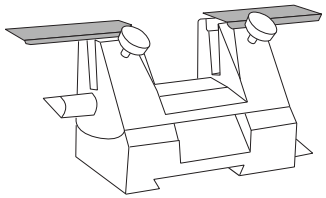
DISPOSABLE BLADE CLAMP
Disposable blades are held in position by a clamp plate that is operated by a movable lever below the plate. Move the lever to the left to release the blade, and to the right to clamp the blade in the required position.

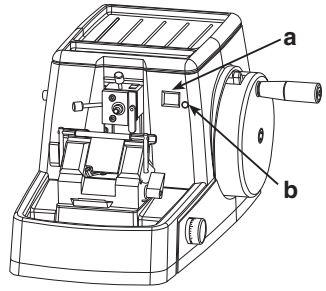


FLIP UP KNIFE GUARD
The Disposable Blade Holder has a Flip-Up Knife Guard that also serves to position the blade.



The Knife Guards of the Universal Knife Holder comprise two platforms - one either side of the cutting aperture. They require no adjustment or setting up.



3.5 THE DISPLAY

A battery driven two digit Liquid Crystal Display (LCD) *(a)* is incorporated in the printed circuit board and made visible via a window near the top right hand corner of the cover. It shows the number of handwheel rotations since last reset, up to a maximum of 99. Push the small push button adjacent to the window *(b)* to reset the counter.